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WASHINGTON, D. C.

VOL. XIV, No. 9 WASHINGTON SEPTEMBER, 1903

THE NATIONAL GEOGRAPHIC MAGAZINE

THE UNITED STATES—HER MINERAL RESOURCES*

BY C. KIRCHHOFF, EDITOR THE IRON AGE

WHEN I was a boy I was taught that in this great country, as in fact in any land, an assured future lay with him who identified himself as closely as possible with the development of its natural resources; that the producer of the primary articles of necessity, the tiller of the soil, and the miner must under all circumstances find an outlet for their energies and a reward for their special skill and knowledge. To one born in the sight of the Golden Gate, soon after the wonderful gold discoveries in California, the future held out vast possibilities to every searcher for treasure; yet the wildest dreams of the gold-seekers of that day have been outdone by the subsequent discoveries of our mineral wealth, although now the yellow metal is occupying a minor place when compared with the useful minerals.

It may be stated as a general proposition that to a civilized community the possession of mineral wealth is important almost in the inverse order of the unit value of the individual mineral. Cheapest and yet most important of all is coal and fuel, next iron, the baser metals, the precious metals, and finally the precious stones. Without the first named no great industrial expansion is possible, while the last named, however welcome, do not through their absence hamper growth.

It is not possible to speak with precision as to the extent of the mineral resources of any country, because new discoveries are made from time to time even in Europe, where exploration has extended over many centuries. It is certainly not possible in our own land, where much territory is still covered with dense forests and swamps and whole mountain ranges have been untrod. Under the circumstances, comparisons are unsafe, but with such qualifications it is stating a fact that the United States has been blessed with almost unrivaled resources.

The geographical distribution of our mineral resources could be fairly well shown in maps and charts, so far as exploration and development have revealed them. We might in that way show our assets, territorially distributed, but we would create a very erro-

*An address before the National Geographic Society, March 4, 1903.

neous opinion of their real value. With the most important minerals the economic value of a deposit is dependent upon many other considerations besides those of mere size and extent. Conspicuous among these are accessibility to markets, the means of transportation, natural or artificial, the existence of a supply of labor and the character of that labor, climate, the character of the community, its laws, etc. These in their shifting influence find expression in the actual product, and that is a better measure of relative importance than mere location and extent.

The latter, designated on maps by coloring, is a poor guide, since relatively unimportant deposits may cover a very extended territory. Coal measures may underlie many thousands of square miles, yet the seams which they enclose may not be numerous nor thick nor possess a coal of satisfactory quality. A field small in area, at some distant place, may be the scene of enormous operations, while the greater basin may hardly be able to supply local requirements. The anthracite coal regions, as to area, constitute only an exceedingly small portion of the known coal fields of the United States, yet their importance overshadows any other industrial district.

Useful minerals are found in deposits which may in general be classified, for the purpose of estimating them as assets, into two groups. First are those which are beds constituting one of a series of strata. They are usually persistent and fairly regular over large areas like the coal seams, and therefore permit of some estimate of their contents. Second are those whose origin is due to local circumstances, and these include the fissure veins. They are usually irregular, and it is in most cases entirely impossible to arrive at any conclusion of their extent and value without most elaborate underground exploration or actual mining operations. It is therefore quite impossible to submit more than very vague data relative to the magnitude of the mineral wealth of any country. In a very rough way we may do so, of course, so far as coal is concerned. How rough that is will be readily understood when the statement is made that out of an estimated coal area of about 4,650,000 square miles in the world, China is credited with 4,000,000 square miles. Our own country is put down at about 280,000 square miles, and this compares with 11,900 square miles for Great Britain, 1,770 square miles for Germany, 2,086 square miles for France, and 510 square miles for Belgium. Considering the enormous tonnage which the European countries named are furnishing from their relative restricted territory, our possible reserves look huge. Of course areas are not a true measure of value or importance. Thus our Pennsylvania anthracite fields embrace a territory of only 468 square miles, and yet outdo in value probably any coal area of like extent anywhere in the world.

We must therefore leave to the imagination the pleasure of dealing with the magnitude of our mineral wealth. All we do know is that it is very great, not alone in its magnitude but also in its variety.

There is hardly a state or territory in the Union which does not possess and is not utilizing mineral property, particularly when we include clays and stone and mineral springs. Maine has her granite and stone; Vermont her marbles, granite, and copper; Connecticut her iron ore; Massachusetts her granite, pyrites, and iron ore; New York, salt, stone, petroleum, natural gas, clays, cement, gypsum, graphite, and iron ore; New Jersey, clays, marls, zinc, and iron ore; Pennsylvania, petroleum, coal, iron ore, natural gas, cement, rock, and clays; Maryland, iron ore; Virginia, coal, iron ore, zinc ore, pyrites, and copper ore; North Carolina, gold, stone, corundum, mica, copper, and iron; South Carolina

and Florida, their phosphates; Tennessee, coal, copper, iron ore, and phosphate rock; Alabama, coal and iron ore; Louisiana, sulphur and salt; Kentucky has coal, iron, zinc, and lead; West Virginia, petroleum, natural gas, coal, and salt; Texas, petroleum, coal, iron ore, quicksilver, and silver; Arkansas, zinc, manganese, bauxite, whetstone, and coal; Missouri, lead, zinc, iron ore, and clays; Ohio has coal, petroleum, natural gas, clays, grindstones, salt, and iron ore; Michigan, copper, iron ore, coal, cement, grindstones, clay, limestone, and salt; Illinois, coal; Indiana, natural gas, coal, petroleum, whetstones, and clays; Wisconsin, iron ore, lead, and zinc; Iowa, clays and lead; Kansas, lead, zinc, coal, natural gas, salt, and gypsum; Indian Territory, coal; South Dakota, gold, copper, and lead; Wyoming, petroleum, coal, copper, salt, and iron ore; Colorado, gold, silver, lead, copper, petroleum, coal, and iron; Utah, gold, silver, lead, coal, iron, and sulphur; Montana, copper, silver, gold, and sapphires; Idaho, lead, gold, and silver; Oregon, gold, copper, and silver; Washington, coal, iron ore, lead, and silver; Arizona is famous for copper, silver, and gold; New Mexico for coal, iron ore, copper, and silver; Nevada for silver, gold, and copper, and California for gold, copper, quicksilver, petroleum, borax, asphaltum, magnesite, and stone.

As the pioneers penetrated into our country they caught some glimpses of these treasures. The Jesuit fathers, in the reports of their journeys in 1659 and 1660, mention the copper of Lake Superior, and Le Sueur, in his explorations of the Mississippi at the commencement of the eighteenth century, noticed the lead deposits of that region. Copper was mined in Connecticut and in New Jersey, and iron manufacture began in New England and in Virginia at about that time, but it was not until the end of the eighteenth century that iron, lead, and copper mining were carried on on a fairly comprehensive scale. Coal was mined in the vicinity of Richmond from 1770 to 1780. In 1820 the first cargo of anthracite reached Philadelphia, while in 1833 and 1834 Virginia, North Carolina, South Carolina, and Georgia were in the zenith of a gold-mining boom which resulted in an annual product of about $600,000. The year 1844 saw the opening of the Lake Superior copper region, and then in 1848 came the famous California gold excitement, followed by gold mining in Oregon in 1852, in Arizona in 1858, in Colorado in 1859, in Idaho and Montana in 1860. Iron mining on Lake Superior began in 1856. In 1859 came the discovery of the Comstock lode, which created an enormous activity in silver mining and led to the opening of the Unionville, Kelso Run, Belmont, White Pine, Eureka, Esmeralda, and Pioche districts in Nevada, the Owyhee in Idaho, the Cottonwood and Bingham in Utah, and the silver districts of Colorado. The year 1860 brought the discovery of petroleum in Pennsylvania, to be followed many years later by the utilization of natural gas.

The development of the copper mines of Arizona began seriously in 1880 and 1881 with the opening of the Bisbee, Globe, and Clifton districts, to which later on the United Verde was added. Butte rushed into prominence at about the same time. Later in the seventies Leadville began to pour forth its mass of argentiferous lead.

It may be stated in a general way that enterprise did not seriously turn to the mining industry in this country until the second half of the last century, and that its greatest achievement has been crowded into the last 30 years. I do not propose to weary you with an endless array of figures. Suffice it to say that the value of the mineral product of the United States had risen to about $370,000,000 in 1880, reached $620,000,000 in 1890, and, according to the

statistics collected by Dr David T. Day, of the United States Geological Survey, exceeded $1,000,000,000 in 1901. This includes $350,000,000 for coal, $242,000,000 for pig iron, $87,000,000 for copper, $78,000,000 for gold, $66,000,000 for petroleum, $55,000,000 for stone, $33,000,000, commercial value, for silver, $27,000,000 for natural gas, and $23,000,000 for lead.

We stand first as producers of coal, our output in 1901 having been 263,000,000 long tons, Great Britain following with 220,000,000 tons, and Germany with 153,000,000 tons, our percentage of the world's total being about 31 per cent. In petroleum we have been racing with Russia, occasionally first and sometimes second. In 1901 we furnished a little over 69,000,000 barrels to the world's total of 165,000,000 barrels, our percentage being 41.9 per cent as compared with Russia's 41.5 per cent.

In the manufacture of pig iron we have now reached the point that our production is greater than that of our largest rivals, Great Britain and Germany, put together, with Belgium thrown in. We manufactured in 1902 fully 40 per cent of the world's total.

The gold production of the world was about $265,000,000 in 1901, to which we contributed $80,000,000 and Australasia $77,000,000. Of course, when the Rand resumes its full production and again starts on its natural increase, we shall probably have to yield first place to it.

The world's production of silver has a commercial value of about $103,000,000. Here again we occupy the first rank, with Mexico as a close second.

The supremacy in the copper mining industry is undoubtedly ours for many years to come. In 1901 we produced over 52 per cent of the total of the world's yield of 512,000 tons. In that year, with a product of 269,000 tons, we came close to the entire world's output in 1890, when it was 273,000 tons.

We stand second in zinc, following Germany. Our output of that metal in 1901 was 125,000 tons out of a total of the world of 501,000 tons, or over 25 per cent.

These figures, enormous as they are, do not really reflect adequately the great importance of our mining, since it lies at the foundation of the manufacturing industries of this country and is the basis of its industrial greatness, backed as it is with an equally lavish supply of raw materials from the forest and the farm. Mining and rail transportation have reciprocally aided one another, and in turn have contributed powerfully to the wellbeing of the farmer and the lumberman.

As in other realms of material progress, the United States has outstripped all other civilized countries in the development of its mining and metallurgical industries.

Brief though the period be during which we have been actively mining, we have witnessed the exhaustion of famous great deposits and the decline of entire camps and districts. This is apt to occur most rapidly in the case of placers, conspicuous among which are the auriferous sands and gravels in which the precious metal has been concentrated by the washing action of streams. California's enormous gold production of the early days fell off rapidly after the first decade of working. The exhaustion of the silver-gold bonanzas of the Comstock lode, the rapid collapse of the mining of silver-lead ores of the Eureka district in Nevada, the practical cessation of working of once exceedingly productive quicksilver mines of California, are a few instances which could be multiplied. Yet thus far we have again and again witnessed the rapid rush into prominence of new districts. Thus Cripple Creek in Colorado recorded its first shipment of gold in 1891, the amount being estimated at $2,000. Two years

later it was $2,000,000, in 1897 it had crossed the $10,000,000 mark, and in 1900 had risen to $18,000,000. Butte, in Montana, was a silver camp of some importance 20 years ago, when copper was discovered and the district suddenly loomed up with exports by the ship cargo of 30 per cent ores to the astounded smelters of Swansea, Wales. When Leadville's great reserves of oxidized silver-lead ores began to show signs of exhaustion, the Cœur d'Alene County, in Idaho, rose to more than fill the gap.

Again and again we have faced the possibility that our petroleum supply would ultimately fail us; yet as the derricks fell into ruins in one field they rose like magic in others, the most startling recent instance being the opening of the California and Texas fields.

Some uneasiness has been felt as to the future of the Lake iron ore supply. The Marquette district was in full development when the Menominee was opened out. Then came in rapid succession the Gogebic and the Vermilion ranges, and finally, as the climax of all, the Mesaba range. Again and again the prediction was made that the old Marquette range would show evidences of exhaustion, and yet year after year new mines have taken the place of old ones. New reserves are being opened up in all the districts until this generation may well dismiss any fears of future supplies, even taking into consideration that the demands are rapidly increasing year after year.

As for our resources of coal, the most important of our minerals, we are not likely to have a Coal Exhaustion Commission, like that of our British friends, for centuries to come.

Our record of feverish activity is one of which we have every reason to be proud, but it must be acknowledged that it has been accompanied by serious abuses. In the rush to get rich we have deliberately followed the principle that it pays to waste. Within certain limits that may be economically justifiable. In a new country, without adequate transportation facilities, high labor, and difficult surroundings, it is possible only to select the best and the richest, but unfortunately in mining that process of selection in most cases practically renders unavailable for the future that which has been rejected. Much of it is forever lost to the world, and what can be saved at a later date can be recovered only at a greatly increased cost. In the early days of our mining we have been unskillful, and even today we are robbing nature's storehouses of treasure, often destroying more than we utilize. At one time, not so many years since, barely one-third of the anthracite coal in our beds finally reached the consumer. The other two-thirds were lost in mining and in preparation for market.

It is characteristic of a great many of the mineral deposits that the mass of the ore, particularly with growing depth, is low in grade, the useful mineral being disseminated in relatively large quantities of barren rock. Very often the rich ore occurs only in streaks and pockets, which constitute a minor percentage in the total amount of valuable material. In hunting for them the poorer material is rejected, although it may be close to the border line of profitable extraction. With improved economic conditions there is greater opportunity, and with greater skill and a broader comprehension there is a growing tendency among managers to rely more and more upon a moderate return on the large bodies of poor ore, accepting the occasional bonanza as a welcome addition to revenue. The reckless hunt for rich streaks is giving way to systematic utilization of a maximum of the deposits. It may not be as merry and exciting a life, but it is certainly a longer one and happier one. There has

been a great improvement in this direction in this country. It should be stated, however, that we can never hope to utilize the entire contents of a deposit. Still, there can be no doubt that we have paid dearly in wasted resources for the achievements of opening them up so rapidly.

We have no particular grounds for mere pride of possession in our magnificent resources. Our glory, from a national point of view, should be completeness of utilization, and that has at times suggested the nationalization of our mineral industry with the object of checking the abuses referred to. It may be doubted whether our practical good sense will ever allow that question to come to the front. The nation as such has only control now of those mineral resources which lie dormant in the national domain. In order to encourage their development, ownership is surrendered under easy conditions to the discoverer. That policy has unquestionably fostered enterprise in the past, but it is an open question whether the time is not approaching when the nation at large must assume the attitude of some state governments and of all private owners of mineral lands. These demand a royalty which may become an important source of revenue, and they generally provide, what is more important to the nation, that the mine shall be operated in a workmanlike manner. The present generation has responsibilities to future generations. In their behalf it has the right and the duty to demand that the nation's gifts be not wantonly destroyed; that every means which engineering skill suggests be exhausted; that every reasonable precaution be taken to preserve from destruction useful mineral which, while not profitably available now, may become highly precious to future generations.

Nor should title to mineral property on the public domain be given without some provision for its surrender as the penalty for long continued idleness. It should revert to the nation when after reasonable opportunity the discoverer is either unable or unwilling to utilize nature's bounty.

The United States has been exceedingly generous in throwing open its mineral resources. It has been a wise policy which the results on the whole have thoroughly justified. But conditions have changed greatly. The opening up of our mineral resources has ceased to be the hazardous undertaking it once was. Their utilization has become an undertaking in which engineering skill can more readily guarantee results. The splendid work of our U. S. Geological Survey has brushed away many uncertainties. The development of our great railway systems has lessened costs, and cheaper and more confident capital has become a willing handmaiden to enterprise. The time is therefore approaching, if it is not now at hand, when the nation is justified in imposing conditions not hitherto warranted. Conspicuous among these should be a rigid enforcement of the obligation to put a stop to wanton waste.

In the last few years a good deal of alarm has been felt that very dangerous monopolies may be created through the control of our mineral resources by powerful consolidations of capital. At the first blush, in studying the magnitude of those resources, we may feel inclined to dismiss the danger as remote. It assumes a somewhat different aspect, however, when we begin to differentiate. The conditions affecting the industrial utilization of mineral property vary greatly, and a closer study reveals the fact that a relatively small number of the deposits, through favoring circumstances, give their possessors special advantages. The deposits may be exceptionally rich or extensive, particularly pure, or may be so located with

reference to the markets that they are capable of yielding an adequate supply at a cost far below others. These advantages may represent enormous sums, and can therefore be capitalized correspondingly. Unless those who control them extort undue returns, measured by earning capacity, the owners of the other less favorably located deposits cannot compete and live. Of course, the risk is always run by those who secure control of the best of the mines that new deposits as valuable may be discovered elsewhere, just as those who utilize monopolies based upon patents take the chance that inventive genius, stimulated by opportunity, made exceptionally artificial, find means to dispute exclusive possession. There may be iron ore deposits as rich and as great as any on the Lake Superior ranges in the Rocky Mountain region, yet for a generation to come they might as well be non-existent, so far as the controlling position of the United States Steel Corporation is concerned. An enormous power for good or for evil may be wielded by groups of capitalists who control the commercially available mineral resources, though they constitute only a small fraction of the total assets of mineral wealth of the country. The fact that in most cases the earning capacity of these consolidations has been rated exceedingly high furnishes a premium on the development of hitherto neglected deposits, and thus constitutes the greatest source of danger to the stability of many of these giant undertakings. What is perhaps to be most deplored is that these organizations, on their present basis, impose upon the industries dependent upon them a burden of fixed charges which must handicap this country in its struggle for an increasing share in the world's markets.

While the record of the achievements in mining, *quantitively*, has been extraordinary in this country during the past fifty years, we may look back with even greater satisfaction upon what has been accomplished *qualitively*, if we may so term it. It cannot be stated in an array of figures, but constitutes even a greater glory to the captains of industry and the engineers and inventors who deserve the credit for it. It is expressed in the more complete utilization of the natural resources, as in the increase in the total extraction of the contents of a coal bed. It is in evidence in the capacity to utilize bodies of ores lower and lower in grade. It is proven by ability to produce from rebellious or impure ores metals nearly chemically pure and commercially available for a wider and wider range of consumption. It is measured by an expansion of markets which may be due to the fact that technical progress has proceeded more rapidly in our country than in others.

While it is true that in these early days our miners and smelters rose to the occasion when they were called upon to meet special conditions, the general fact is apparent from a study of our development that generally we first copied and then adapted the methods approved by experience in Europe. There were some very notable exceptions. We were forced to and did create hydraulic mining to collect the gold from alluvial deposits. We developed the preparation of anthracite for the market. We had nothing to guide us in the handling of the native copper rock of Lake Superior. The Washoe process was worked out to treat the silver ores of the Comstock lode. There were no precedents for methods in the petroleum industries, and we had to learn by ourselves how to collect, distribute, and utilize natural gas. We taught the world how to use the steam shovel in mining. We have pushed the development of the rock drill in mining and quarrying, and in more recent years have been in advance of all countries in the employment of modern coal-cutting machinery. Still it is a

fact that Cornish, Welsh, and English miners long controlled the working out of our mining methods, and that German and English metallurgists guided our first steps in utilizing our more complex silver, lead, and copper ores.

One of the most brilliant reports on the state of the art ever written, that of the late Abram S. Hewitt on the Paris Exposition of 1867, is a confession of superiority of European methods in iron manufacture, which is almost staggering to one who reads it in the light of the present day. I cannot help feeling that the recognition of our indebtedness to European practice in the earlier days should be insisted upon, since it is becoming altogether too common to assume that we are the chosen people so far as the mechanic arts are concerned. That feeling is so often encountered that the fear of the danger of overconfidence is naturally aroused.

A striking fact is the growing interdependence of the various branches of the mechanic arts as contrasted with the conditions prevailing 25 years ago. The one relies upon the other, not alone for its products, but is aided, too, by suggestions and support. The metallurgist's progress is accelerated by the mechanical engineer, and the latter looks to the former for increasingly strong and reliable materials. The electrician has greatly widened the capacity for improving methods on the part of the copper producer, and in turn is under a debt to the copper miner, and the achievements of the rail-maker are returned in kind by the railroad builder, who has taught both much of value in transporting materials. Thus all are shoulder to shoulder in the march of progress, mutually helpful and united—all powerful.

To a constantly increasing degree pure science, primarily in search of the truth for its own sake, sheds its searchlight along the path, and has become a closer and more valued ally year by year. The majority of active workers looked askance at this meddler, preferring to allow their own fancy full sway whenever they stopped to seek for causes or explanations. Practical men may sometimes become impatient when the laborious and apparently hypercritical methods of the scientist do not more promptly clear an obscure point or furnish him with a suggestion for successful new lines of work, but the day has long passed when research was treated with grudging respect, if not with open hostility. No one is now readier to acknowledge his indebtedness to the chemist or the physicist than the manager or the practicing engineer. The fear is disappearing of impracticable science on the one hand and of unscientific practice on the other.

The mining industry has suffered and, unfortunately, will suffer, particularly in its relation to labor, from one apparently trifling circumstance, and that is the impression which a visit to underground operations makes upon the average layman. To be dropped suddenly into the dark depths with only a flickering candle to guide the uncertain steps, appalled by the dead silence or alarmed by strange noises, the rumble of the distant car, the reverberation of a shot far away, the rushing of unseen streams of water—the visitor is impressed with a sense of insecurity and danger. The bright sunlight has never seemed sweeter to him than upon his return to the surface, and if he happens to have access to the columns of the press he describes in lurid language the awful experience which incidentally convinces him that he is braver than he gave himself credit for in his innermost heart. Mining in the popular mind becomes one of the most hazardous of callings when, as a matter of fact, there are many others above ground which involve greater risks. With some exceptions, of course, the conditions which surround the work of the miner are

rather favorable. He is not exposed to the rigors of the elements, and particularly during the last few decades the hygienic conditions have been brought to a high standard.

It is a fact that progress during the last 50 years has been pushed along lines even more important in their way than the increase in tonnage, the cheapening of product, or the raising of the standard of quality. The captains of industry in mining have, like others, displayed increasing care of their armies of men.

It has become an axiom with every enlightened manager that every means which shall render more satisfactory the surroundings of the worker is bound to tell upon the results of their labor. A comparison of our modern mines and plants with those of former decades, of which some even now survive, proves what attention is paid to making the conditions under which manual labor is performed as tolerable as the circumstances will permit. There has been a tremendous improvement in this direction, and it does not lessen the achievement when we frankly acknowledge that it is largely due to the recognition of the fact that progress in this direction pays handsomely.

Let me go a step further, and that is to make the claim that the crowning glory of the efforts to improve our mining and metallurgical industries has been that they have contributed their full share to the development of this materialistic age. They have helped to bring within the reach of an ever-growing circle of people not alone the necessities, but also many of the comforts and some of the luxuries of life. Let me confess that it seems to me the greatest and most commendable of achievements to raise ever so little the mass of humanity in civilization, and that is what progress in the mechanic arts during the past century has accomplished in a striking manner. Start the masses on a higher plane—level them up. The great genius may not tower so far above them as once he did; but that is again in harmony with our democratic institutions. Let there be an increasing equality of opportunity, even though it makes the struggle fiercer and fiercer, if only public conscience will demand with sterner emphasis that the methods for achievement be lawful and fair.

EXPEDITION INTO TEXAS OF FERNANDO DEL BOSQUE

STANDARD-BEARER OF THE KING, DON CARLOS II IN THE YEAR 1675

TRANSLATED FROM AN OLD UNPUBLISHED SPANISH MANUSCRIPT
BY BETTY B. BREWSTER

ON the 19th day of November, 1674, Don Antonio Balcarcel Rivadaneira Sotomayor, alcalde maior of the town of Nuestra Señora de Guadalupe de la Nueva Estremadura (now Monclova), having decided that the good of his majesty's service required a military organization to show the force and arms his majesty could bring to resist the Indians, who might not wish to live peaceably under the royal protection and who by their

example would seduce into rebellion barbarous tribes from whom injury to the royal service might be apprehended, resolved, under the authority of his royal commission and in the name of the king, to have the royal standard raised. After assisting at the holy sacrifice of the mass he gave the order and said: I consign this royal standard to the keeping of Fernando del Bosque, a Spaniard of the greatest experience and trustworthiness; in whom are united all the qualifications and parts required, and in the manner that I should and ought and find occasion to as conquistador of the new conquest and settlement; and in the name of the king I elect him to be such royal standard-bearer for this new conquest and settlement, and in it shall be accorded to him all the preëminences and privileges allowed other royal standard-bearers of like new conquests, having and holding him for such royal standard-bearer. And he shall use and exercise such office as he can and ought in all things and causes connected therewith.

To this the said nominee assented and received said royal standard and offered to serve his majesty voluntarily and of his own will, without regard to any salary or pay therefor, and he made oath in the following form: I swear and make homage according to law, one, two, three times; because, being out of Spain I ought to do it the more: to hold and to guard this royal standard in peace and in war; working solely in the service of the king until the time shall come when I must die upon it, and when in obedience to the royal command whoever may be present shall carry it to the one that shall next be charged with its keeping. And I will fulfill all that a faithful vassal and loyal hidalgo should.

Father Juan Larios had been lately appointed by the Franciscan order comisario misionero for the region beyond the Rio del Norte, and had been directed to carry his work of evangelization to the savage tribes inhabiting it. He and that other intrepid priest, Father Manuel de la Cruz, had already entered Texas several times. Father Freyes, the historian, says that Father Manuel de la Cruz penetrated into the country as far as the Medina River. He had remained over the Rio del Norte with a tribe called the Boboles, but being informed that the Yrbipias had planned to capture him by command of a god that they had, this god being a man who had ordered them to bring the daring missionary before him to answer for his temerity in coming into the country, the Boboles defended the priest, by command of Don Estaban, chief of the Gueiquesales. This chief with six Indians of his tribe came to see General Balcarcel, and, being asked his purpose in coming, said that he and his tribe desired to become Christians and to receive religious instruction, and he had come in the name of the following tribes, all of whom were his friends and allies: the Gueiquesales, Manos Prietas, Bocores, Siaexer, Pinnancas, Escabaca-Cascastes, Cocobiptas, Cocomaque, Oodame, Contotores, Colorados, Babiamares, Taimamares. These tribes had received religious instruction from the missionaries, and on one occasion they had protected them from the Yrbipias, who wished to capture Father Manuel de la Cruz when he was on the other side of the Rio del Norte.

On the 13th of January, 1675, another Indian, who was a Christian and called Francisco, belonging to the tribe called Bagnanames, accompanied by the chief of his tribe, who was called in the idiom of his people Yosame Carboan, and eighteen warriors and three women, came to see General Balcarcel. All of them were brought by the Christian Indian, Francisco, from the mountains called Dacate in the Indian language, and which are about thirty leagues on the other side of the Rio del Norte.

They said that they were tired of wandering through the mountains and dying like animals. On the 26th of January, 1675, there came to General Balcarcel Pablo, an Indian chief of the nation called Manos Prietas, and with him eight Indians of the Gueiquesales, the Bapacorapimancos, and Espopolames. These, being examined, said that they were Christians and had been baptized by Father Juan Larios, and they had come to make their submission to the king. On the 29th of April, 1675, this same Indian Pablo came and brought with him 232 persons, great and small, as follows: 120 warriors, 65 women, and 47 boys and girls. They had come to ask to be placed in settlements, and said that they had left a large number of their people congregated together toward the Rio del Norte; that they were very numerous; they could not tell how many. These were followed by other chiefs living beyond the Rio del Norte, all of whom asked to be placed in settlements and to have missionaries sent to them.

General Balcarcel, having established his settlement of Nuestra Senora de Guadalupe de Estremadura, in December, 1674, commenced building a church, which was soon completed. Royal orders had been issued to push the conquests as far as possible, and to gather the Indians together into settlements, where they might receive religious instruction, cultivate the soil, and live peaceably under the royal protection. General Balcarcel, in compliance with this order, determined to send an expedition, under military command, along with Father Juan Larios, who had been appointed and directed to proceed at once to the conversion of the barbarous Indians living beyond the Rio del Norte. The military commander of this expedition was Fernando del Bosque, the royal standard-bearer, and Father Juan Larios, accompanied by Father Dionisio San Buenaventura, both of the Franciscan order, was to have charge of all matters pertaining to the missionary purpose of the expedition. With these there were ten other Spaniards—an interpreter of the Spanish and Indian languages, Don Lazaro Augustin, himself an Indian, and Juan de la Cruz, of the Boboles, his ensign, and 20 others of his tribe who were most faithful to the Spaniards, and 100 warriors of the Gueiquesale tribe accompanied the expedition.

They were ordered by General Balcarcel to proceed to the Nadadores, and beyond as far as the Sierra Dacate, and to instruct the Indians to plough their lands and to cultivate them, and live industriously, and they should go to such places as the good service of their majesties required, and they should instruct the Indians in the Holy Catholic religion, and should take royal possession of all parts of the country visited, and take note of the longitude of the rivers, and of the trees, forests, and mountains, and should count the people, great and small—men, women, and children.

JOURNAL OF FERNANDO DEL BOSQUE, ROYAL STANDARD-BEARER, IN COMMAND OF THE EXPEDITION

April 30, 1675.—Left the town of Nuestra Senora de Guadalupe of this province in obedience to the order of the alcalde maior, Don Antonio Balcarcel Riva de Neira Sotomayor; traveled along the river below the town toward the north, and having reached a place called Pajarito, on the river, about six leagues from the town, we found it unpossessed and without any signs of having been recently inhabited. We took possession of it in the name of the king our master, Don Carlos II, whom God defend, and in sign of possession we erected a high wooden cross, and at this place we saw many fish in the river and caught some. We gave it the name of San Felipe de Jesus.

May 2, 1675.—On the first of May

left the place called San Felipe de Jesus, always traveling toward the north, along the same river for about four leagues, where it joined another stream, which we traveled along, still toward the north, leaving on our right hand in the direction of the sunrise a range of high hills with sharp peaks, and passing beyond them we reached the ford of a river called the Nadadores, which place we found unpossessed and uninhabited. We took royal possession of it in the name of the king. Today religious instruction was given to the Indians, who were fishing in the stream, which was full and swift. There were poplars and forests of mesquite along its banks. This place is about ten leagues from San Felipe. We erected a high wooden cross on the bank of this river and named the place San Francisco del Paso. We saw taken from this stream turtles and many large fish.

May 4, 1675.—Having left the place called San Francisco del Paso on the Nadadores, and having crossed the river and traveled toward the north, having all the time a high and long sierra on our left (this long chain ran from south to north), after traveling about four leagues we came to a creek at a long ridge; there was running water in it, and our Indians called it in their language Toporica. We took royal possession of it in the name of the king, and in sign thereof erected a high wooden cross. We gave this place the name of Santa Cruz.

On the same day, month, and year, having left the place called Santa Cruz and having traveled about four leagues toward the north, still having the said chain of mountains on the same side of us, we reached a creek below a ridge and in front of a peak. There was running water in it and a growth of tule. We took possession of this place in the name of the king and gave it the name of Santa Catalina Martyr. We erected a high wooden cross and performed the other acts necessary to the assertion of our rights of possession. Religious instruction was given to the Indians.

May 5, 1675.—Left said place called Santa Catalina Martyr and traveled about six leagues toward the north, having the sierra already mentioned always in the same position. We reached a broad river with groves of very large poplars, cedars, and mesquite, with extensive and beautiful plains of green grass; a delightful place. The Indians said it was called the River Savinas, or, in their language, Muero. We gave it the name of San Antonio. It was uninhabited. We took possession of it in the name of the king, our master, and in sign thereof erected a high wooden cross. There were fish of all kinds in this river and in abundance. Religious instruction was given to the Indians by the missionary fathers.

May 7, 1675.—We left the Rio San Antonio and traveled toward the north. About 12 leagues from said Rio San Antonio de Savinas we came to a watering place, to which we gave the name of San Ilefonso. We found it uninhabited, with only the ruins of two grass huts. We took possession of it in the name of the king, our master, and in sign thereof erected a high wooden cross. We gave this place the name of San Juan Evangelista. The missionary fathers gave religious instruction to the Indians.

May 9, 1675.—Having left the place called San Juan Evangelista and traveled toward the north about 6 leagues, across a plain with clumps of mesquite trees, we came to another watering place, in which there was tule growing. It was between high ridges, with groves of oak trees. We found it uninhabited and took royal possession of it in the name of his majesty and for said conquest, and we gave it the name of San Raymundo de Pena Fuerte, and in sign of possession erected a high wooden cross. Religious instruction was given to the

Indians by Father Dionisio San Buenaventura.

May 10, 1675.—Having left the place called San Raymundo and traveled toward the north about 3 leagues, we reached a river that ran from west to east, which our Indians said was called Agua Azul (Blue Water). There were a great many fish in this river of all kinds, and it was a very beautiful place, with many poplars, willow, mesquite, and guisache trees and plains of green grass. It was uninhabited and we took possession of it in the name of the king, our master, and in sign thereof erected a high wooden cross. We called this river Rio de San Josefa. The missionary fathers gave religious instruction to the Indians.

May 11, 1675.—Having left the place called Rio de San Josefa and traveled about 3 leagues toward the north, through a very grassy plain, with many mesquite trees, we reached a very broad, full, and swift river, its width being about 400 varas. This our Indians said was called the Rio del Norte. We found it uninhabited and deserted but for a few ranches of those Indians who construct their huts of grass; as we had traveled above the ford, our Indians determined to cross where the river was divided into three streams. It was necessary to construct rafts of wood to cross over the middle one. In crossing the first the water reached above our stirrups and almost to the covers of our saddle trees. It was 200 varas wide and a vara and a half in depth all the way through, and there were willow trees on its banks and on an island in the middle. It was very pleasing, and there were many large fish and turtles caught, to which we bear witness, having held them in our hands. We took possession in the name of the king, of said river and territory. This stream appeared to run from west to east. We gave it the name of San Buenaventura, and in sign of possession erected a high wooden cross. Father Dionisio San Buenaventura gave religious instruction to the Indians.

May 13, 1675.—Having left the place called Rio San Buenaventura del Norte and traveled toward the north about 4 leagues, we reached a creek between some ranges of hills, where we found 54 Indian warriors of the Yoricas and Jeapes tribes, with loads of buffalo meat. We examined them through Don Augustin, the interpreter, in their language and the Spanish. Having asked them many questions, they said they had come to kill buffalo to get meat for the sustenance of their families and ranches, and having no food in their country, necessity had compelled them to come so far in search of it; that there was a great number of them, they could not say exactly how many; that they desired to become Christians and to be placed in settlements and receive religious instruction from the missionaries; that the fear they had of other tribes, who were their enemies, had prevented their going to seek them; that two of their number had been killed, those who had done this being the Ocames, Pataquakes, and Yrbipimas; and that in proof of their submission to the king, our lord, they would go with us as far as the Indian tribes of the Sierra Dacate and Yacasole, and they would send to their ranches for their people to come out to wherever our chaplain could give them religious instruction. We named this place San Gregorio Nasianseno.

May 14, 1675.—We started, having with us the Indians of the Yoricas and Jeapes, already mentioned, and traveled from the place called San Gregorio Nasianseno for about three leagues toward the north. We reached a watering place in a plain without other trees than mesquite. We found it uninhabited and unpossessed. We took possession of it in the name of the king, and in sign of possession thereof erected a high wooden cross and named the place

San Bisente Ferrer. The missionary fathers gave religious instruction to the Indians.

On the same day and in said province and place called San Bisente Ferrer, the Indians and Spaniards killed two buffalo for our people to eat; the form of these animals is very ugly; they resemble bulls and cows; the skin is covered with wool; their shoulders are high, which makes them look humpbacked; they have a short neck and their heads are covered with long woolly hair, which hangs over their eyes and interferes with their seeing well. Their horns are short and thick, but like those of a bull; their rump and buttocks are shaped like those of a hog; their forefeet and knees, and from there up until the junction with the shoulders, are covered with long woolly hair, like the beard of a goat. Their tail is naked to near the end, where it has a heavy tuft of hair. The females had four teats. They were about the size of neat cattle; they looked at people in a sidelong way like wild boars.

In this same place, San Bisente Ferrer, on this same day and month and year, before me, Fernando del Bosque, lieutenant of the alcalde maior, appeared an Indian chief of the Bibit nation, who said he was a Christian and had been baptized in Saltillo, and another Indian, who said he was chief of the Jume nation. They were examined through the interpreter, Don Lazaro Augustin, in their language and the Spanish language. Being asked several questions, they said they had desired for a long time to become Christians, and some of their people had gone to the town of Saltillo and succeeded, but the greater number of them were unable to go, for it was far and they could not bring their people, for which reason many of them had died from smallpox without receiving the waters of baptism, and they wished and asked to be gathered together in a settlement and to receive instruction in the Christian doctrine. This they had not been able to do themselves; nor had they been able to join the remainder of the tribe for fear of the barbarous Indians, who would kill them and the people they had with them, being one hundred and five persons, great and small—fifty-five warriors and the remainder women and children.

In said place, San Bisente Ferrer, on said day, month, and year, before me, said lieutenant, appeared six Indian warriors who said they belonged to the Pinanacas, Xaeser, Teneinamar, who are of the party of Don Estaban, Gueiquesale. They were examined by Don Lazaro Augustin, interpreter, in their idiom and the Spanish language. Being asked why they had come to see me, they replied that they had come in the name of their chiefs and to make homage to his majesty the king, and that they wished to live under the Christian doctrine and to remain in a settlement.

May 15, 1675.—Having left the place called San Bisente Ferrer with our company, the missionary fathers, Spaniards and Indians, we traveled toward the north, and reached a river about four leagues from the place called San Bisente Ferrer, which our Indians said was called in their language Ona, which means salty. We took possession of it in the name of the king, and in token thereof erected a high wooden cross. We named this place San Isidro Labrador. We found many live oak and mesquite trees and herds of buffalo, fine pasturage, and many fish in the river. It was uninhabited.

In said place and said province, said day and year, in said place called San Isidro Labrador, before me, said lieutenant, appeared the chiefs, Xoman, Tereodan, Teaname, Tumamar, with their people, whom we examined through sworn interpreters acquainted with the Mexican and Castilian lan-

guages, these being Don Lazaro Augustin, governor of the pueblo of San Miguel de Luna, of the town of Guadalupe, of this province, and Pascual, an Indian. These chiefs were each asked questions apart from each other to see if what they said agreed, and they all said that they were heathen, without knowledge of the true God or what He was; nor did they know anything of the true way of salvation and were without light in regard to it; that they wished to become Christians and to be baptized with their children and their wives and to live as such in the settlement or settlements in which they might be placed, and though they were too old to enjoy it themselves, their children could, and they would raise them as Christians and they would continue in the same way, and from this time they gave their allegiance to the king, our master, Don Carlos II, and they would be friends to the Spaniards. At this they all shouted, "*Viva, Viva, Viva*, the King, our master!" and from what I observed, with much sincerity and zeal. In the name of the king I received them under the royal protection, and assured them on the part of the king that all would be accomplished, and I demanded that on their part they should live quietly and peaceably and assemble for catechism at the place most convenient to them. Because of the distance from their habitations and of the dissensions that existed between the barbarous tribes in the territory, the one against the other, and which lead to their killing each other, and not having the means of feeding so many people myself, I told them to remain for the present in the most convenient place. They said through the interpreter that they would do so. Their people came up and went and kissed the sleeves of the habits of the missionaries, Fathers Juan Larios and Dionisio de San Buenaventura, and asked permission to give them an offering of what they had, in thanksgiving to God for having opened to them the way of truth. They then placed on the ground, some a piece of lard, some a piece of tallow, and others the skins of animals, such as they use for clothing, beds, and covering.

In said place and river of San Isidro, in said province, on the 16th day of May, 1675, we erected a portable altar with fittings for the purpose of celebrating mass, and at the sound of a little bell all the people came to be present at it and to hear mass chanted by Father Juan Larios. All the people attended, and when it was over they begged Father Larios to baptize them. He made them understand by the interpreter that he could not do this until they had learned the prayers, and he consoled them by baptizing fifty-five children at the breast, the Spaniards being sponsors for them. Religious instruction was given them, and acount, was made of those with the four chiefs and they numbered four hundred and twenty-five warriors and seven hundred and forty-seven women and children of all ages, making a total of one thousand one hundred and seventy-two.

At said place of San Isidro, on said day, month, and year, I, the lieutenant of the alcalde maior, installed in possession of his ministry, as comiserio misionero, Father Juan Larios, in accordance with the royal provision.

On said day, month, and year, and at said place, before me, said lieutenant of the alcalde maior, appeared an Indian of the Guiequesale nation, and brought into my presence a Spanish boy, who appeared to be about twelve years old. He had a line on his face, marking him from his forehead to his nose, and two lines on his cheeks, one on each, and rows of them on his left arm and one on the right. Having examined said Indian through the interpreter, D. Lazaro Augustin, and the Indian, Pascual, also an interpreter, he said, being asked where he had gotten the Spanish boy,

that his, the said Indian's, mother had raised the boy; that many years before the Cabesas had brought him with others from Yndee, near Parral, and had given him to his mother, and that he loved him as his own brother, and he had brought him to the Spaniards as a proof of friendship and in order that he might be sent to his own parents. The boy was not examined at this time as to how many more Spaniards the Indians had because he could not speak the Spanish language. Only said Indian was asked if there were more Spanish children among the Indians. He said that said Cabesas Indians, when they had brought this one, had another boy and a girl, and they killed the boy with their arrows, having placed said boy standing up, and he saw that he clasped a cross in his hands, and that he recited prayers and was praying until he died; and that the Spanish girl they kept with them to serve them, and that in a raid the said Cabesas made to rob and kill, one of their own number was killed, and they took the girl and shot her with arrows until she was dead, and they left her lying in that place, and that two years afterward he passed that place and found her just as she had been left; her body had not become corrupted nor had the animals eaten it; and, seeing that, he had taken her up and carried her to a cave, where she now was, and that she had very long hair, and he knew no more than this, which was the truth.

May 18, 1675.—In said province I, said alcalde maior, having left said place called San Isidro and traveled about 8 leagues, more or less, toward the north, and having reached a place and a small stream which was said to be called Dacate, found it abandoned and uninhabited. We took possession of it in the name of the king, and we gave it the name of San Bernardino, and in sign thereof we erected a high wooden cross; and this day came before me the chief of the Geniocane tribe of Indians, who said that he was awaiting the missionaries, with his people in another place further on, so that they might receive religious instruction, and the reason they had not come was because of the number of their enemies, who would not allow them to pass and seek succor, and, above all, they killed one another; and upon this the missionaries determined to grant their petition and give them religious instruction and spiritual assistance.

May 20, 1675.—Having left the place called San Bernardino in company of said fathers, comisario misionero and capellan gobernador, and Indians, and having traveled about 8 leagues toward the north and in said district, said Indians that had come out to receive us reached their village or assistencia. It was on a stream, between two ridges, where there were many arbors of grapes growing like wild grapes, and the green grapes were very large, like those of Castile, and there were a great many of them, like a vineyard. We took possession of it in the name of the king, and in sign thereof erected a high wooden cross. Religious instruction was given to the Indians by Father Dionisio San Buenaventura.

May 21, 1675.—In said province and said place, already mentioned, which we gave the name of San Jorje, I, said lieutenant of the alcalde maior, bear witness that said fathers comisioneros ordered an altar to be erected, and on it the father Dionisio de San Buenaventura offered the holy sacrifice of the mass, and said Geniocanes Indians assisted at it, with those of the other tribes, and after mass they received religious instruction from Father Juan Larios; and having counted them there were sixty-five warriors and one hundred and thirteen women and children, making a total of one hundred and seventy-eight persons of said Geniocane tribe, all of whom desired to become Christians,

and asked the father Comisionero to let them become Christians, and he consoled them by telling them when they had learned how to pray he would baptize them. On this day the said comisario misionero took possession of the exercise of his office.

May 23, 1675.—In said place of San Jorje, I, said lieutenant of the alcalde maior, having recognized how great was the number of Indians desiring to become Christians and to be placed under religious instruction, and in villages and settlements, as each day there came to me chiefs from the various tribes, and as they are all far from the town of Guadalupe and enemies to each other, yet all wish to be instructed in the Christian doctrine at the same time, and as they gather together according to their barbarous feuds, and fight and kill each other. (The country is apparently divided into three parts or tracts. The country which reaches from Guadalupe to the north, on the left hand, is under the control of Don Estaban, chief of the Guiequesale, and that in the center is peopled by the followers of Juan de la Cruz, captain of the Bobole nation, and that on the right hand, occupied by the Catujanos, Tilijæs, Apes, Pachaques, with their followers among the Indians) and all wish to receive religious instruction from the missionaries and Spaniards, and they are in the midst of enemies, and we were unable to carry out their wishes, I determined to return to the town of Guadalupe and make a report to the alcalde maior.

May 25, 1675.—In said province I, the lieutenant of the alcalde maior, having left the place called San Jorge in said company of the comisario misionero and the chaplain and traveled about 14 leagues toward the north, reached a small creek with many groves of trees. We found it deserted and uninhabited. It was between high-peaked ridges. We took possession of it in the name of the king and erected a high wooden cross in sign of possession. We gave it the name of San Pablo Ermitano. Religious instruction was given to the Indians by Father Dionisio San Buenaventura, and he asked the Indians of the four chiefs, already mentioned in the report, at San Isidro and followers of Don Estaban if they would remain quiet in their territory and not fight and kill each other, and would congregate themselves together under their principal chief, and these chiefs said that they would remain quiet, waiting until a missionary should be sent to them to instruct them, and in the meantime they would assemble in pueblos.

May 29, 1675.—In said province I, said lieutenant of the alcalde maior, having left the place called San Pablo Ermitano on our return to the town of Guadalupe in company of said missionary fathers, the Spaniards and Indians reached another point of the Rio San Buenaventura del Norte, where we found a part of the Indians of the Boboles tribe with their women and children, who were there killing buffalo for their subsistence. It was some time since they had left their pueblo. They were asked if they would join with their chief and others of their tribe and receive religious instruction from the missionaries, and they agreed to this.

June 1, 1675.—In said province I, said lieutenant of said alcalde maior, having left said Rio de San Buenaventura and traveled about 20 leagues toward the west, reached a river which was said to be called the Nueces, where we found the chiefs of the Bocora and Pinanaca at some springs of water with many walnuts and groves of different kinds of trees. We took possession of it in the name of the king, and in sign thereof erected a high wooden cross. Religious instruction was given to the Indians by Father Juan Larios, and an altar was erected under a cover of branches and Father Dionisio San Bue-

naventura said mass, and at the sound of a bell the people congregated to recite the prayers. A count was made of the followers of the Bocora chief there, and they numbered 150 persons—62 warriors and 88 women and children—and in this place I gave him* possession in all that related to his ecclesiastical administration.

June 10, 1675.—In said province I, the lieutenant of the alcalde maior, having left the river and place of Senor San Diego, in said company of the comisario misionero and the chaplain, Spaniards and Indians, and traveled about twenty-two leagues, passing through the valley of the Rio San Antonio de Sabinas, we entered through an opening of one of the large sierras, called Obayas, and reached a creek, which we found deserted, uncultivated, and uninhabited. We took possession of it in the name of the king, for this conquest, and gave it the name of San Anbrosio, and in sign of possession we erected a high wooden cross, where the comisario misionero said mass, at which the Contore chief, Don Bernabe, with his people was present, and after mass religious instruction was given to the Indians by the comisario misionero. We counted this nation and they numbered 78 warriors and 130 Indian women and children.

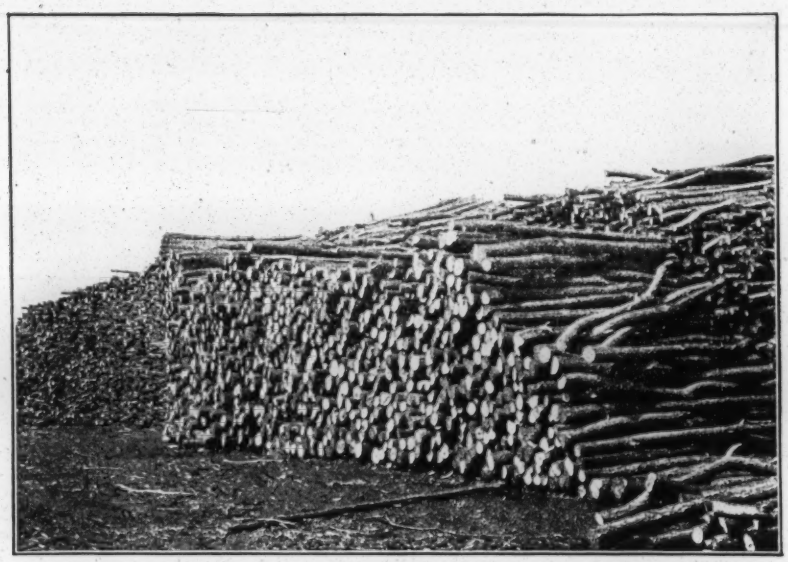
June 12, 1675.—In said province I, the said lieutenant of the alcalde maior, having left the place called San Anbrosio, and traveled about 14 leagues as it appeared, and toward the city of Guadalupe, and opposite it, at the foot of a high sierra, and toward the west of it, in company of said missionary fathers and Spaniards, we reached a water hole, deserted and uninhabited. We took possession of it in the name of the king, and in sign of possession erected a high wooden cross and named the place San Bartolemé. At this place came into my presence Don Salbador, chief of the Bobosarigami, with some of his people, who said he had sent for the remainder of his people, who had scattered for want of food. They were given religious instruction by the comisario misionero, Father Juan Larios, and afterward they were counted, and they numbered 44 warriors and 75 women and children with the Tetecores; and they were directed to unite with the others, under Don Bernabe and Don Estaban. To all of which we bear faith and sign with said fathers and our assisting witnesses, who were Anbrosio de Berlanga and Diego Luis Sanchez, Fernando del Bosque, Fr. Juan Larios, Fr. Dionisio de San Buenaventura, Diego Luis Sanchez, Anbrosio Berlanga.

On June 12 the expedition returned to the town of Nuestra Senora de Guadalupe, and the royal standard-bearer, Fernando del Bosque, reported to the alcalde maior and conquistador, Don Antonio Balcarcel Rivadaneira Sotomayor.

* The comisario misionero.

THE HARDY CATALPA

ONE of the most important and interesting efforts of the Bureau of Forestry is to encourage landowners to start plantations of commercially valuable trees. A large plantation of useful trees, such as the Hardy Catalpa, a few years after planting, will yield each year in posts and stakes about as large and regular a return on the original investment as an orange or fruit plantation. There are a number of Hardy Catalpa plantations in Kansas, Iowa, and Nebraska which for several years have been paying their owners very good profits. The tree grows rapidly, and is exceedingly durable. The



From Wm. L. Hall, U. S. Department of Agriculture

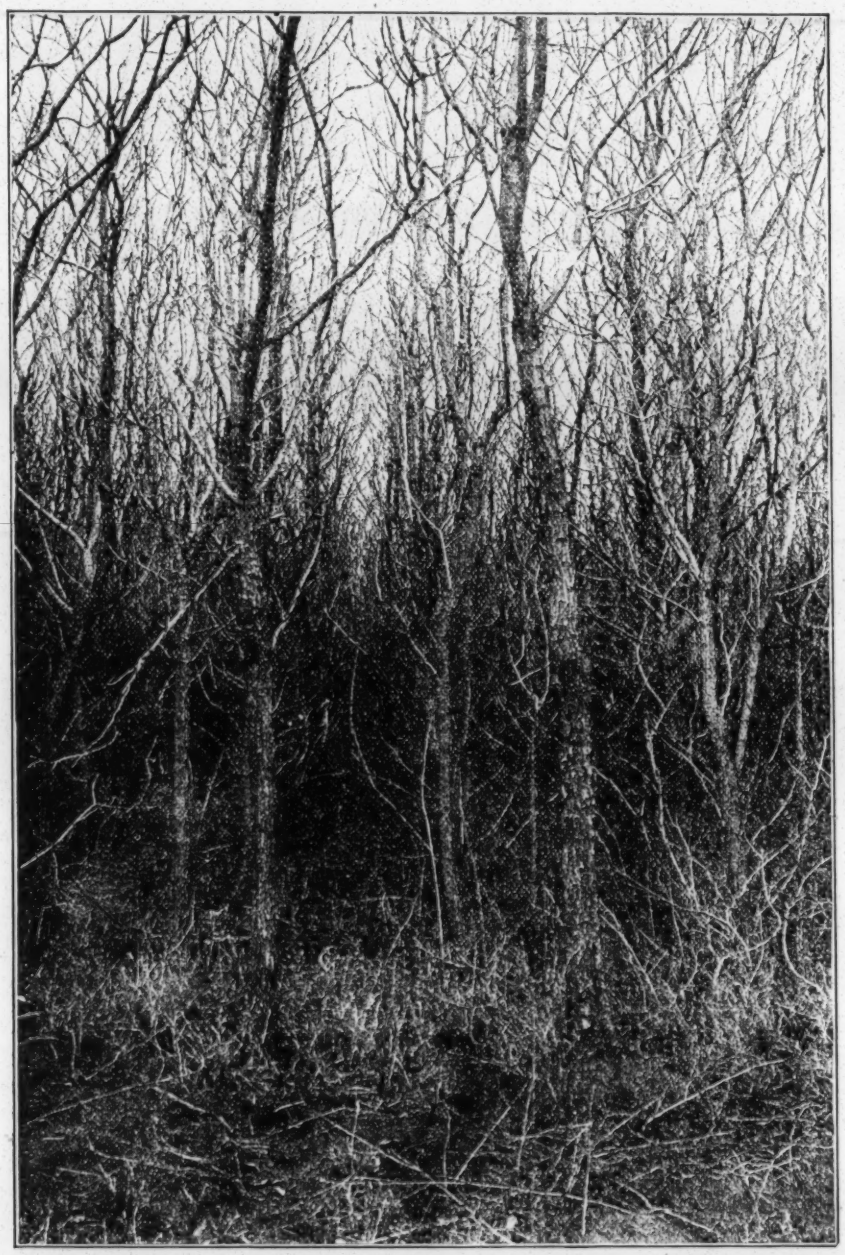
Posts from the Planting of 1890, Yaggy Plantation

Bureau of Forestry has made a special study of the Hardy Catalpa, and recently published an interesting little book describing the tree, by Mr William L. Hall. The following paragraphs are an abstract of the report :*

Forest planting on the prairies west of the Mississippi River began with the earliest settlers. To plant trees for protection from sun and wind seemed one of the first and most important things to be done, and with the building of a house and the breaking up of a garden patch it formed a part of the settler's first summer's work. Each year thereafter, as time and means permitted, the plantation was increased. Scarcely a decade passed before extensive groves for the general purposes of shelter and ornament appeared on almost every farm. The success of these proved that the want of the natural forest could in part be supplied by planted timber.

The growing of forest trees for other farm needs, such as fuel, posts, and poles, was also practiced by many settlers, for the prices of these materials were extremely high in the districts far from the natural forest. The idea of growing posts and poles to sell, however, did not meet with approval for a number of years. It was too long an investment to be attractive in a country just settled. About twenty-five years ago a few men, impressed with the prevailing high prices of such materials and believing it possible to produce them in plantations within fifteen or twenty years, began to plant timber as an investment. Their example encouraged others to plant for the same purpose, and as a result of the work there are now in the Middle West quite a large number of commercial plantations, in some of which the marketing of products has already begun.

* The Hardy Catalpa By William L. Hall, Superintendent of Tree Planting. With 30 full-page plates. Bureau of Forestry, U. S. Department of Agriculture, Bulletin No. 37.

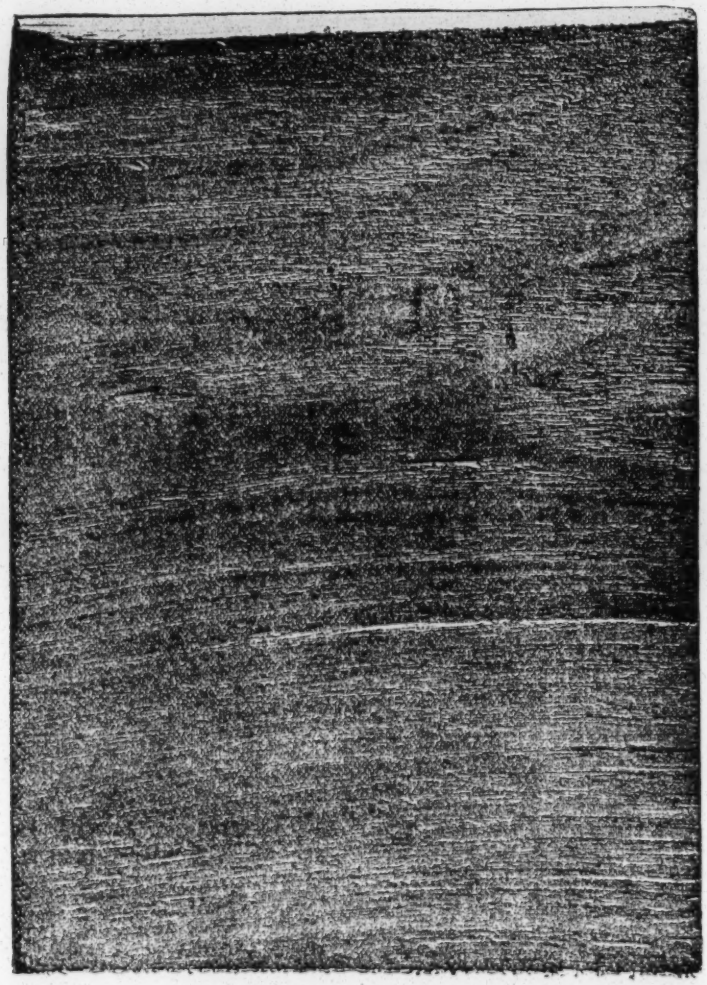


From Wm. L. Hall, U. S. Department of Agriculture

Trees which were not Cut Back when Young. Planting of 1891

Many side branches and crooked form the result

Of the trees used for commercial planting none have been planted more extensively in the region of southern Iowa and Nebraska and eastern Kansas than the Hardy Catalpa. In its native habitat along the lower Wabash and Ohio Rivers this tree nearly a century ago gained a reputation for rapid growth and durability. A few years' trial on the plains sufficed to prove its good qualities for that region. It was easily propagated, grew rapidly on prairie soil, had good form, was drought resistant, had few insect or fungous enemies, and above all was a lasting timber, adapted to many uses. Such good qualities soon



From Wm. L. Hall, U. S. Department of Agriculture

Wood of the Hardy Catalpa After Lying Ninety Years in Water

Block from a tree which grew near New Madrid, Mo., and was felled by the earthquake of 1812. It was taken out of the water a short time ago and worked into fence posts

From Wm. L. Hall, U. S. Department of Agriculture

A 20-Year-Old Plantation of Hardy Catalpa, Southern Iowa

brought it into general recognition. In the regions named it took the lead as a commercial tree, especially for such purposes as fence posts, telegraph and telephone poles, and railroad ties.

Its value for most of these purposes has been quite fully demonstrated. As a post timber it has given excellent satisfaction. It ranks with Black Locust and Osage Orange in durability, while it surpasses them in rate of growth, form, penetrability, and freedom from checking. Altogether, as a post timber suitable for growing in a large section of the Middle West it has no equal. For telegraph and telephone poles its only deficiency seems to be a tendency toward crookedness, but possibly this can be overcome by special treatment.

As a railroad-tie timber the Hardy Catalpa has not had sufficient trial to demonstrate what its rank should be. Experiments have left no doubt as to its resistance to decay. The only question lies in its resistanee to wear. So far as tried, it does not stand the wear and tear of a railroad track so well as White Oak, especially under heavy traffic. In the Middle West, however, the traffic on many railroads is comparatively light, while the decay of timber is particularly rapid. Under these peculiar conditions Catalpa will probably outlast Oak as a tie timber. The main commercial plantations of Catalpa are in Iowa, Kansas, and Nebraska. Kansas especially has a number of large and highly successful plantations.

EXPLORATIONS IN TIBET

AN interesting account is given in a late number of the *N. Y. Tribune* of some recent explorations in the heart of Tibet by a Russian subject, G. Z. Zoubikov, who succeeded in residing quietly at Lhassa for some months. Zoubikov's success deserves especial credit in view of the recent unsuccessful attempts to enter Lhassa by Sven Hedin and Colonel Kozloff.

M. Zoubikov is a Bouriat and a graduate of the Oriental Faculty of the University of St Petersburg. As a born Buddhist and familiar from childhood with Tibetan, he found no difficulty in passing for a llama. He brought back a great number of photographs and other illustrations of the life of the country, and his book, which will soon be published, will contain much information hitherto unobtainable.

M. Zoubikov made an extended report of his journey at a meeting of the Geographical Society a few days ago. He was immediately awarded the Przhevalsky prize, which is conferred in honor of the first Russian Tibet explorer.

The frontiers of Tibet, which were closed to European travelers after the French explorers Huc and Gabet were expelled from Lhassa, in 1846, have not been absolutely shut against a certain portion of Russian subjects, namely, the Buddhistic Bouriats of the Baikal region. The Bouriats are talented people, and the same value attaches to M. Zoubikov's observations as would be the case were he a European. His stay lasted over a year.

In the summer of 1900 M. Zoubikov entered Tibet from the north as a member of a caravan of seventy pilgrims, including many llamas. He approached central Tibet by the Boumza Mountain, where Przhevalsky was turned back in 1870. The road led through a treeless country with snow-topped mountains extending east and west in parallel chains. The people in this region were few and nomadic. An agricultural

community was found within only sixty or seventy miles of Lhassa.

CLIMATE AND POPULATION

The climate was found to be harsh and dry. Snow falls occasionally from December to March; rain from May to August. April, September, October, and November are dry. The medium annual temperature was found to be 42, 67, and 50 degrees Fahrenheit for morning, noon, and night respectively. The data for December was 17, 34, and 27 degrees, and for July 60, 77, and 65 degrees.

The population, which has at times been estimated at 33,000,000, is probably about one-tenth of this number. It is decreasing through disease, particularly smallpox, and on account of the large number of celibate priests.

The sons of Chinese soldiers and merchants temporarily resident in Tibet are counted Chinese, the daughters Tibetans. Other foreign residents are Indians from Cashmere and Mongolians and Tibetans from Nepul, the latter being skilled artisans, architects, sculptors, and jewelers. The Cashmere Mahometans are traders. They usually convert their Tibetan wives.

Almost all the land in central Tibet belongs to the Dalai Llama. Only high officials in Lhassa have hereditary homes. The Tibetan houses are of brick and stone, and have chimneys only in the kitchen. The other rooms have holes to let the smoke escape, and are cheerlessly cold. Dried dung is the principal fuel.

The common folks wear white, the wealthy red, officials yellow, and soldiers blue clothing of homespun. Jewels are worn in great abundance by the women. Barley meal, soup, the raw flesh of the yak and of sheep, butter, sour milk, and vegetables are main items of the diet. Wheat spirits sell for a cent a bottle. Men smoke tobacco and the priests take snuff.

PEOPLE RELIGIOUS AND IMMORAL

The people of central Tibet are passionately attached to their religious observances, which are purely formal. Prayers are regarded as of magic potency and figure in all ordinary and extraordinary affairs of life. Medicine is in small popular favor. Morals are primitive, and marriage ties are loose. Both polygamy and polyandry are common.

Agriculture and cattle-raising are the principal employments. Wheat, barley, peas and beans, cattle, sheep, yaks, horses, asses, and mules are the main products. Yaks and asses are used as pack animals. Labor is cheap, men being paid two or three cents a day, while women usually serve for their food and clothing. Even a llama receives only ten cents for a whole day's prayers. Sheepskins, cattle, yak tails, statues, books, and yellow llama caps are exported. The yak tails serve as horse tails in the outfit of Turkish pachas. English and Indian cottons and woolens and copper and enamel utensils are introduced from India and tea, silks, cottons, horses, and asses from China.

EXHAUSTING METHOD OF WORSHIP

Lhassa was built in the seventh century. It has a picturesque location on the southern slope of a mountain, with luxurious gardens on the west and south. The Uitchu River passes to the south of the city. Dikes and canals have been constructed as protections against overflows. A fine, broad street around the city serves for religious processions and penitential exercises. Penitents go the length of this street, falling to the ground every five or six feet, so that in a day they prostrate themselves about 3,000 times. The city is small, having at most only 10,000 regular inhabitants. It is, however, an important trade center. The native traders are all women.

The Temple of Buddha, in the center of the city, is about 140 feet square. It is three stories high and has three gilded Chinese roofs. It shelters a gigantic bronze statue of Buddha, which has a hammered gold and jeweled headdress. A sacrificial fire, fed with melted butter, burns before the statue. Other statues and relics are kept in other chambers of the same temple, among which is the statue of the Goddess of Women, to which are offered spirits and wheat. The wheat is at once eaten by mice. In the same temple are also rooms for the Dalai Llama and his council.

The residence of the Dalai Llama is about a mile away from Lhassa, on Mt Bodala. It was built in the seventh century. Near by is the old castle Hodson-Bodala, which is 1,400 feet long and nine stories high. Here are the treasury, the mint, the schools of theology and medicine, quarters for 1,200 officials and 500 monks, and a prison. As many as 1,000 priests take part in religious processions to this mountain.

M. Zoubikov also minutely describes various monasteries and temples, including three near Lhassa, where 15,000 monks are mainly engaged in learned pursuits. At one of these—Brabun—nearly 6,000 boys, young men, and even gray-bearded patriarchs are studying theology, the total number of resident monks being 8,000.

SELECTION OF THE LLAMA

Tibetan Buddhism, brought from India in the seventh century, struggled against the native Shamanism until the ninth century, when a compromise was agreed upon. According to the current teaching, there are many spirits which are continually reincarnated in men. The Dalai Llama is the living Buddha. Another defender of the faith is the spirit Choidshen, whose power is manifested through pious ascetics who spend their lives in contemplation.

Since the fifteenth century all power, civil and spiritual, has been nominally in the hands of the Dalai Llama, but China maintains a Manchu resident and an army. In order to avoid strife in selecting a Dalai Llama, the electoral council places three strips of paper with the names of three boys in an urn, and the Manchu resident removes one with a small staff. The new Dalai Llama's education is intrusted to a college of learned men. Until his twenty-second year the government is in the hands of a regent appointed by the Emperor of China. The present Dalai Llama is twenty-seven years old. He is the fifth since 1806, one of the regents having continued in authority for an unusually long time, owing to three children selected to be Llamas having died before attaining majority.

The Dalai Llamas' Council, in whose hands is the actual power, embraces four so-called "Galons," appointed by the Emperor of China. The administration is in the hands of a closed aristocracy, and bribery and corruption are nearly universal. Among the common penalties are drowning, torture, flogging, banishment, and fines. The Tibetan army of four thousand men is poorly disciplined, and is armed with bows and old fashioned guns. Robbery flourishes.

GARDENING IN NORTHERN ALASKA

By Middleton Smith

PROBABLY the first experimental gardening in Alaska, north of the Arctic circle, was done by the International Polar Expedition to Point Barrow, Alaska, 1881–1883, which was organized for the purpose of coöp-

erating in the work of circumpolar observation proposed by the International Polar Conference. The main object of the expedition was the prosecution of observations in terrestrial magnetism and meteorology. Experimental gardening was an elective investigation.

The arctic night at Point Barrow, which is of 70 days' duration, ends at noon on January 23, when the upper edge of the sun's disk appears above the southern horizon. The next day the entire disk is visible. Each succeeding day the sun rises a little earlier and a little more to the east of south, and sets a little later and a little more to the west of south, and finally, when the day and night are of equal length, it rises directly in the east and sets in the west. The day continues still to lengthen and the night to shorten until the middle of May, when the midnight sun appears above the northern horizon and the long arctic day begins; the sun then remains above the horizon both day and night for 70 days, or until July 24, when it dips its lower disk at midnight below the northern horizon, and night and day again begin. But at no time are the sun's rays at Point Barrow vertical. The maximum altitude is 42° 3′, which occurs at noon on June 22.

The snow does not begin to melt until after the sun remains continuously above the horizon, and does not disappear before July, but the land close to the coast is practically free from snow by the fifth of June. The snowfall is very light, the depth on the land along the coast at no time exceeding 15 or 18 inches. The total annual precipitation—rainfall or melted snow—is only eight inches.

A level treeless area (tundra) occupies the entire Point Barrow region. The subsoil, principally sand and gravel, perpetually frozen, is covered on the tundra generally by a light, clayey soil, and at spots near the coast by a dark, loam-like soil, which thaws to a depth of from 3 to 9 inches. Upon the latter soil, within 200 yards of the ocean water line, the gardening described in this article was done. The soil has been enriched somewhat by refuse from Eskimo iglus, or permanent dwellings, which many years previous existed there. The garden was dug to the depth of about 4 inches and raked. No other preparation of the soil was made, and no further attention was given to the garden from the time of seeding to harvest day.

On June 13 the seed of lettuce, radish, and mustard were sown. By this date caterpillars, worms, flies, and beetles appeared; ranunculus flowers were in bloom. June 21, one day before the sun reached its highest altitude and eight days after the date of seeding, the lettuce and radish germinated, but the mustard failed of germination. By this date additional species of flowers, including the daisy and the willow, were in bloom, and the pools of fresh water, which had formed on the tundra from rain and melted snow, were fairly alive with insect life, upon which the red phalarope was feasting.

The following table shows the temperature, precipitation, and weather from date of seeding to germination:

Month.	Temperature.			Precipitation.	State of weather.
	Max.	Min.	Mean.		
	° F.	° F.	° F.	*Inches.*	
June 13	36.1	31.8	34.25	0.00	Foggy.
14	37.0	32.0	34.52	0.21	Cloudy.
15	35.0	31.9	33.75	0.12	Foggy.
16	35.2	29.1	32.41	0.00	Foggy.
17	36.9	29.0	34.20	0.00	Foggy.
18	45.2	30.9	38.55	0.00	Clear.
19	41.5	35.1	38.94	0.01	Cloudy.
20	38.9	33.0	35.57	0.05	Cloudy.
21	35.3	31.0	33.52	0.02	Cloudy.

The minimum temperature was below freezing seven days out of the nine required for germination. The maximum was above 40° on only two days.

The mean daily temperature, from hourly readings, ranged from 32°.41 to 38°.94, the general average mean for the entire time being 35°.08. The total precipitation was 0.41 inches. The state of the weather was cloudy or foggy, excepting one day, when it was clear. Flurries of snow were not infrequent.

On July 10, twenty-seven days after seeding and nineteen days after germination, harvesting began. The lettuce leaves were from 1 to 2 inches in width and from 3 to 4 inches in length. The radishes, spherical in form, were from ½ to 1 inch in diameter. The condition of these vegetables at the time of harvest was perfect. The quality could not be excelled by any grown anywhere in lower latitudes, Antarctica, by inference, excepted.

Table Showing Temperature, Precipitation, and Weather from Date of Germination to Harvest.

Month.	Temperature.			Precipitation.	State of weather.
	Max.	Min.	Mean		
	° F.	° F.	° F.	*Inches.*	
June 22	34.3	26.8	30.92	0.01	Cloudy.
23	33.2	29.0	31.85	.....	Fair.
24	37.3	30.1	31.54	.....	Clear.
25	53.5	34.0	43.00	0.00	Fair.
26	38.8	32.0	33.92	.....	Cloudy.
27	33.7	29.6	32.27	0.03	Cloudy.
28	34.9	29.3	32.29	.....	Cloudy.
29	37.5	29.8	34.20	0.00	Cloudy.
30	40.6	32.0	35.14	0.00	Foggy.
July 1	43.4	32.2	39.10	0.02	Cloudy.
2	48.7	34.0	42.18	0.00	Fair.
3	39.8	31.6	35.37	0.03	Cloudy.
4	41.2	32.2	37.72	0.00	Cloudy.
5	47.4	33.2	41.50	0.00	Fair.
6	46.7	39.8	43.97	0.00	Fair.
7	60.6	42.2	53.35	0.00	Clear.
8	49.0	36.2	44.28	0.00	Clear.
9	43.4	29.8	35.98	0.04	Foggy.
10	55.2	37.3	46.51	0.00	Clear.

During the nineteen days required for the crops to mature the minimum temperature was 32° or below for nine days. The maximum temperature was 50° or above for three days only. The mean daily temperature, from hourly observations, ranged from 32°.92 to 53°.35, the general average mean for the entire time being 38°.16. The total precipitation was 0.13 inches. There were 4 clear, 5 fair, and 10 cloudy or foggy days.

A study of the conditions under which the plants germinated and matured is not only curiously interesting, but suggests that there was some stimulating force—perhaps the large amount of atmospherical electricity—which caused them to arrive at maturity in a much shorter period than those grown in temperate zones. Whatever the agency, inasmuch as the summer season is so very brief, it is absolutely necessary that plant life in the north should arrive at maturity very quickly in order to perpetuate the species.

The vast tundras of northern Alaska are nature's gardens—the most extensive, the least cultivated, the most productive of any on the American continent. Every summer continuous beds of flowers on these level treeless areas extend north from the Arctic Circle to the shores of the ocean. True, the flowering plants are lowly in stature, but they are not pitiful or frost pinched as might be supposed. True, they keep close to the frozen ground, as if in love with mother earth, but they display masses of color—yellow, purple, and blue—so bright as to make them visible at great distances; and in the fall of the year their ripe foliage and the golden sunshine cause the tundras to fairly glow in rich colors—red, purple, and yellow—still further intensified by the varied colors of the ripening berries growing almost everywhere, all blending harmoniously with the neutral tints of the ground lichens and mosses, on which they seem to be painted.

EXCAVATIONS AT ABYDOS

THE following letter from Prof. Flinders Petrie to the *London Times* outlines his work at Abydos during the present year:

To the Editor of the *Times*:

SIR: The continuation of the work of the Egypt Exploration Fund at Abydos this year has given a wider view of the early civilization, of which the general lines had been fixed by the previous work on the Royal Tombs and the town. The clearance of the old temple site over several acres has brought to light, in a depth of about 20 feet, no less than ten successive temples ranging in age from about 5,000 to 500 B. C. For the first time we can see on one spot the changes from age to age through the whole of Egyptian history. To separate these buildings was an affair of anatomy rather than spade work; the walls of mud brick were so commingled with the soil that incessant section-cutting with a sharp knife was the only way to discriminate the brickwork. Often only a single course of bricks or a thin bed of foundation sand was all that told of the great buildings which had existed here for centuries. Over 5,000 measurements were taken for the plans and levels. The main result as regards the religion is that Osiris was not the original god of Abydos; the jackal god, Upuaut, and then the god of the West, Khentamenti, were honored here down to the XIIth dynasty. The most striking change is seen about the IVth dynasty, when the temple was abolished, and only a great hearth of burnt offering is found, full of votive clay substitutes for sacrifices. This exactly agrees with the account of Herodotus that Cheops had closed the temples and forbidden sacrifices. This materializing of history is made the more real by finding an ivory statuette of Cheops of the finest work, which shows for the first time the face and character of the great builder and organizer who made Egyptian government and civilization what it was for thousands of years after. This carving is now in the Cairo Museum.

The discoveries of the civilization of the Ist dynasty, the beginning of the kingdom, expand what we already had from my work in the Royal Tombs. Of Menes, the founder, we have part of a large globular vase of green glaze with his name inlaid in purple; thus polychrome glazing is taken back thousands of years before it was previously known to exist. The free use of great tiles of glaze for wall coverings shows how usual the art was then. In the highest art of delicate ivory carving there are several pieces of this age; especially the figure of an aged king, for its subtlety and character, stands in the first rank of such work, comparable to the finest carvings of Greece or Italy. We must now reckon the earliest monarchy as the equal of any later age in such technical and fine art.

Pottery of forms and material quite unknown in Egypt also belongs to this remote age; and it proves to be identical with that in Crete of the late neolithic age. This fresh connection illustrates the trade and the chronology of that period. A head of a camel modeled in pottery takes back its relation to Egypt some 4,000 years; hitherto no trace of it had appeared before Greek times. An ivory carving of a bear extends also the fauna of early Egypt.

The great fort long known as the Shunet ez Zebib is now connected with the remains of another fort, which was discovered between that and the Coptic Deir, which is in a third fort. These buildings prove now to have been the fortified residences of the kings of the IId dynasty, whose sealings we have found in the dwelling-rooms.

Of a later age may be noted some

large decrees of the Vth and VIth dynasties, the oldest example of iron yet known, which is of the VIth dynasty, and in the XVIIIth dynasty a great memorial tablet of the grandmother of that line, and the remains of a cliff temple of the type of Deir el Bahri. These are but the salient points of a winter's work of much historical interest. The collection will be exhibited as usual at University College, Gower street, from July 1 to 25.

Unhappily, the growing lawlessness of Egypt, which Lord Cromer noticed in each of his recent reports, has affected our work, and "a large number of offenses, not very serious in themselves, but which cumulatively become serious, have been committed, and but too often have been committed with impunity" (Report, 1902, p. 40). A statue was stolen from my house, and though the footprint of the thief exactly agreed with the very peculiar foot of one of the men who were notoriously accused in the village, and all the links were named by witnesses, yet no conviction could be obtained; £35 are said to have changed hands as bribes over this. Next, my workmen from Quft were subject to a general conspired assault in the market and each robbed of his money at once; but no redress whatever could be obtained. The police officer added to the injury by taking away one man who had been beaten to see the doctor, who did nothing but detain him till he paid 10*s.* bribe to be let go. Last year the relations of a man who died of fever were mulcted of £6 by another doctor, and on my complaining the official inquiry resulted in giving an account which was absurdly false, to my personal knowledge.

It is impossible that the present machinery can work to elicit the truth. Witnesses are examined by petty officers, who dictate the final statement of evidence at their own will, and the witnesses are summoned through their sheikh, who is the first man to be "squared" by the offenders, and "who, they think, will assuredly, sooner or later, endeavor to wreak his vengeance on them" (Report, p. 36). Such a system—dating long before the British occupation—is the most perfect for facilitating bribery and the suppression of truth. This is not the place to discuss the remedies. Happily, Lord Cromer considers that "the points which most require attention are the police, the department of justice, and sanitation." I do not touch on more personal threats to our party and being fired at, as I only wish here to refer to the failure of justice. But matters have gone so far that we must look for safety to our own resources rather than to the law, which has in each case proved to us useless.

I remain your obedient servant,

W. M. FLINDERS PETRIE.

University College, June 22, 1903.

GEOGRAPHIC NOTES

FOREIGN COMMERCE OF THE UNITED STATES IN 1903

THE foreign commerce of the United States in the fiscal year just ended is larger than in any preceding year in its history. The total of imports and exports, as shown by the Department of Commerce and Labor through its Bureau of Statistics, is, for the year 1903, $2,445,610,417, against $2,310,937,156 in the year 1900, which was considered the banner year prior to 1903. Imports are larger than in any preceding year and exports are larger than in any preceding year save in the exceptional year 1901. The imports for the first time crossed the billion-dollar line, the total

being $1,025,619,127, and the exports for the second time crossed the 1,400 million line, being $1,419,991,290, or practically 1,420 millions. The single year in which the value of exports exceeded those of 1903 is the fiscal year 1901, when the total was $1,487,764,991. The imports exceeded those of 1893 by about 159 million dollars and the exports exceeded those of 1903 by about 572 million dollars. The imports, therefore, have increased 18.4 per cent during the decade and exports have increased 67.5 per cent during the same period.

The growth in importation, which is the most striking characteristic of the year's commerce, is very largely in materials for use in manufacturing. Only eleven months' figures are yet available in such detailed form as to show the increase by great groups, but the figures of the eleven months ending with May show that articles in a crude condition for use in manufacturing increased 62 million dollars, or about 20 per cent, as compared with the corresponding months of last year; articles partially manufactured for use in manufacturing increased 4 million dollars, or about 5 per cent; articles manufactured and ready for consumption increased 18 million dollars, or about 13 per cent, and articles of voluntary use, luxuries, &c., increased 14 million dollars, or about 12 per cent, while articles of food and live animals increased 15 million dollars, or about 8 per cent.

WHITE POPULATION OF THE CHIEF BRITISH COLONIES

MR W. P. REEVES, in a recent issue of the London *Times*, gives a careful estimate of the population of the principal British colonies, which is just now a matter of special interest. The figures given with regard to it by writers and speakers differ widely. This is not surprising, as most of the statements are based upon official returns published from two to twelve years ago. In the case of Africa south of Zambesi, it is impossible to hope for exactness, and Mr Reeves has therefore given a figure slightly below what seems to him probably correct. The total—11,075,000—will doubtless appear low to many British colonists, but not only aborigines, but Asiatics resident in the colonies, have been deducted.

White Population in July, 1903

Canada	5,525,000
Australia	3,860,000
South Africa	875,000
New Zealand	815,000
Total	11,075,000

For some little time past the average increase of whites in the British colonies has been at the rate of about 20,000 per month.

The Building of Dalny.—Russia, in the name of the Chinese Eastern Railway Company, is making tremendous progress in building the great commercial city of Dalny, which has superseded Port Arthur. The Russian engineers, with 20,000 Chinese laborers to carry out their plans, have already made 50 miles of streets, of which 12 miles are macadamized; one good-sized dry dock has been built and another dry dock large enough for the largest steamers is nearly completed. Repair shops and foundries, tramways and electric power plants have been constructed. An enormous pier is nearly finished, which is to be 1,925 feet long and 350 feet wide, and has a depth of water of from 18 to 28 feet and which will contain seven railway tracks and nine large warehouses. The present population of the city is over 42,000. The Bureau of Statistics of the Department of Commerce and Labor has published a comprehensive report on "The Building of Dalny," by the U. S. commercial agent at Dalny, M. M. Langhorne (Advance Sheets of Consular Reports, July 28, 1903, No. 1708).

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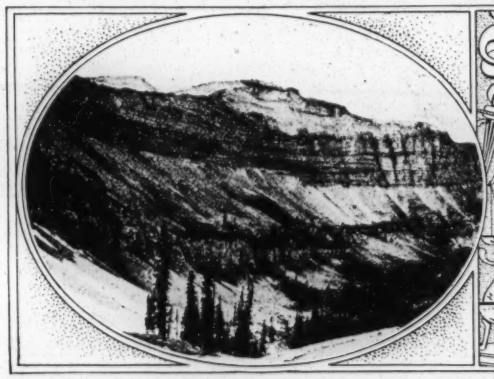

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